Climatological Atlas of Northeastern Atlantic and Western Mediterranean for the period 1981-2010 based on ERA-Interim Reanalysis

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Outline

- Motivation
- Methodology
- ERA-I vs buoy data
- Final products

Motivation

- Maritime climate information is very important for the long term planning of a number of activities as maritime transportation of goods and people, fishing, touristic cruises, etc.
- A number of atlas of waves and meteorological conditions on seas have been produced historically (Weather Bureau, 1938; HMSO, 1949; KNMI, 1957; Crutcher, 1969; Young, 1996; Lindau, 2001; Steurer, 1990), one of the most recent developed by KNMI based on ERA-40 reanalysis (Sterl and Caires, 2005).
- Our aim was to update the maritime climate information to the period 1981-2010 for the areas for which the Spanish Meteorological Agency (AEMET) issues predictions of maritime meteorology.

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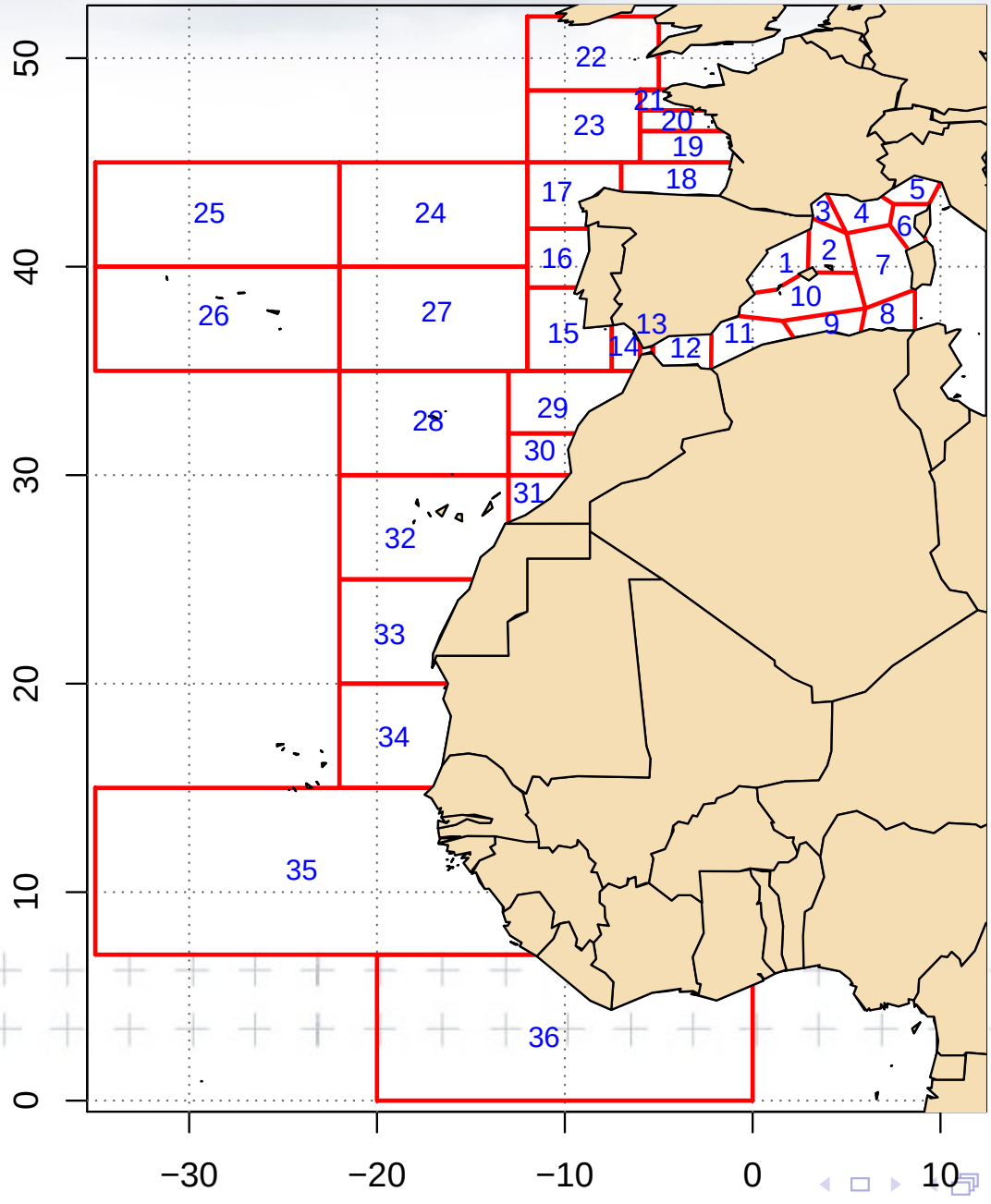
Maritime zones



Methodology

- ERA-Interim reanalysis was used as source of data due to its high quality and resolution (1°).
- Wind and wave variables were downloaded from 35°W to 12°E and 0 to 52°N and for the period 1981-2013.
- Reanalysis data were compared with deep water buoy measurements from the Spanish Agency Puertos del Estado for the five years 2009-2013.
- Maps and graphs of significant wave height, wind speed, mean period and sea surface temperature were developed with programs written in R.
- The final atlas was produced as a PDF document generated with LaTeX.
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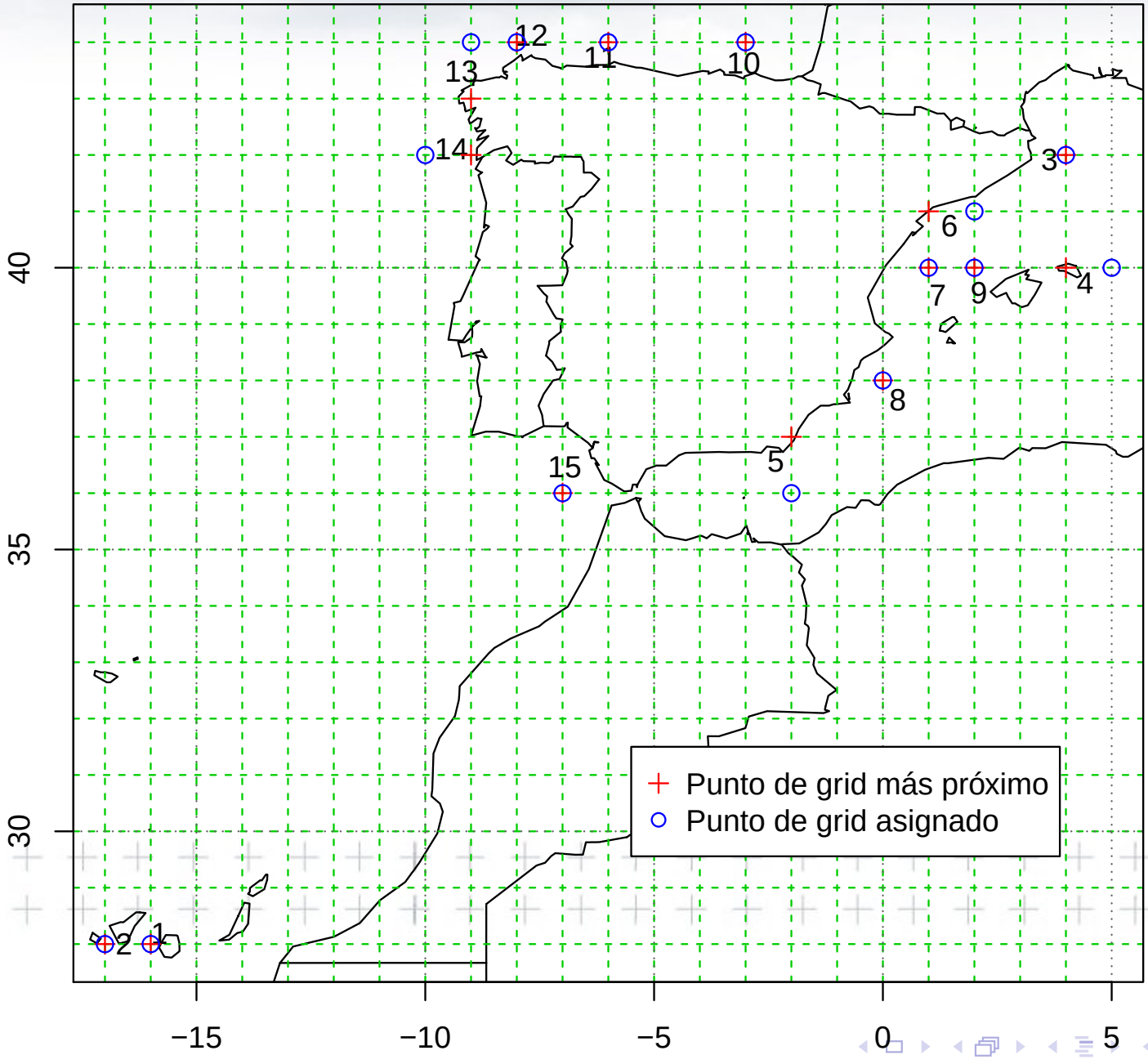
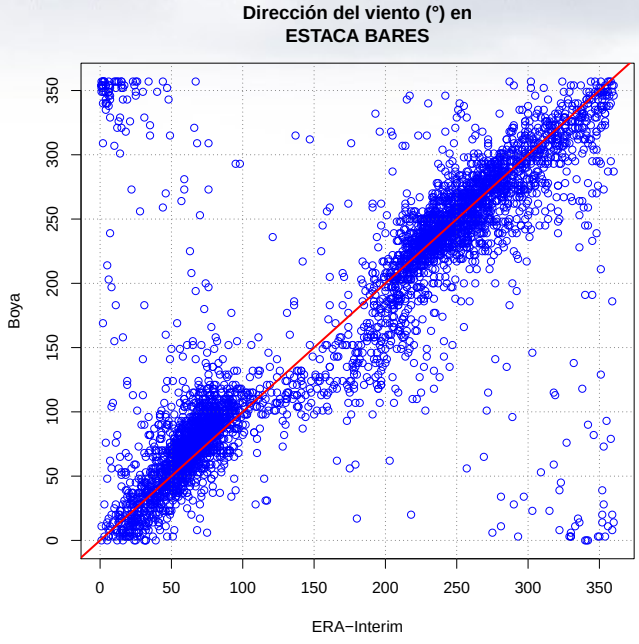
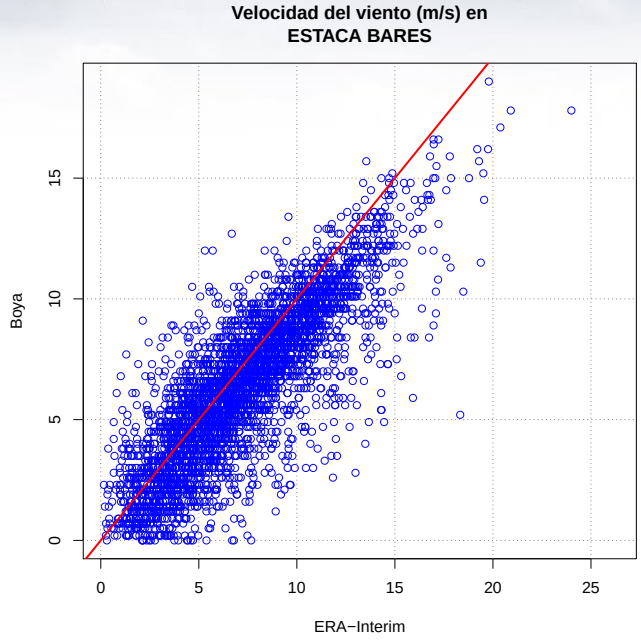
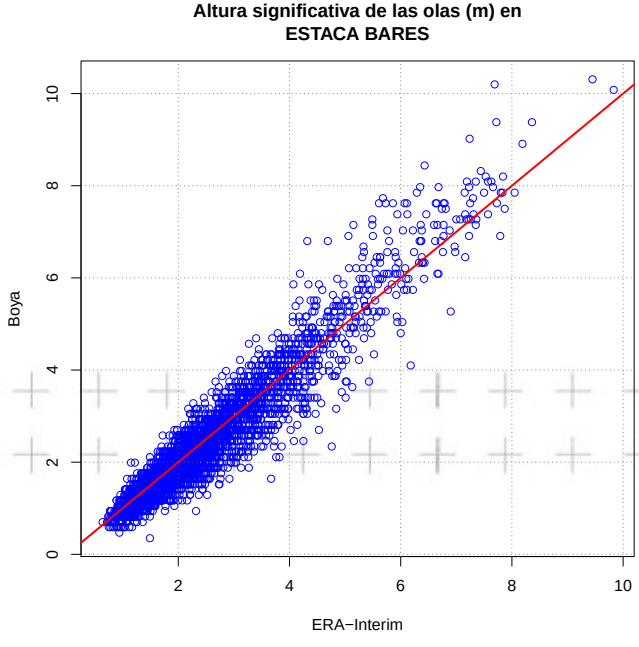
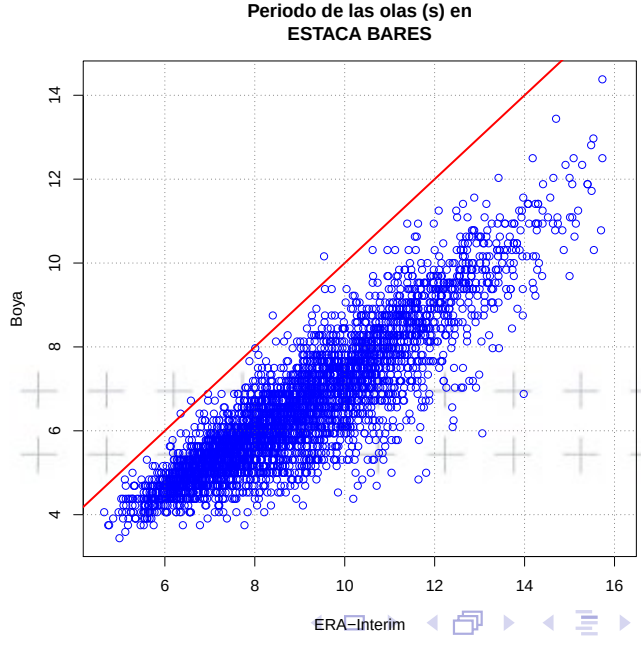


ERA-I vs buoy data

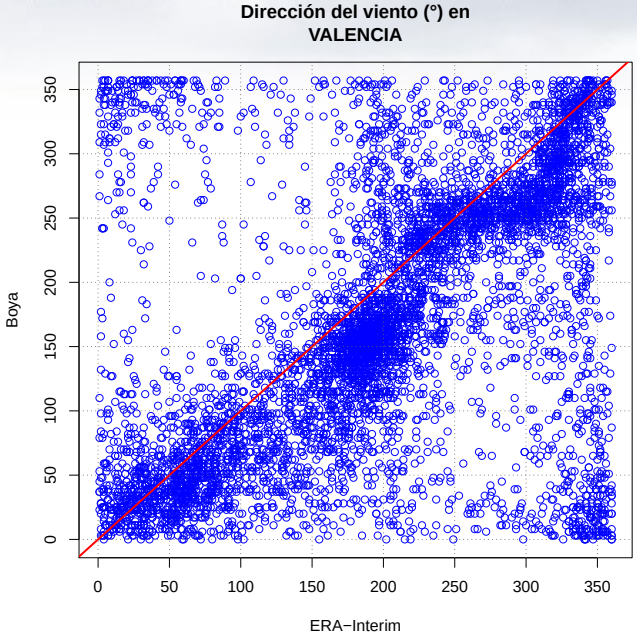


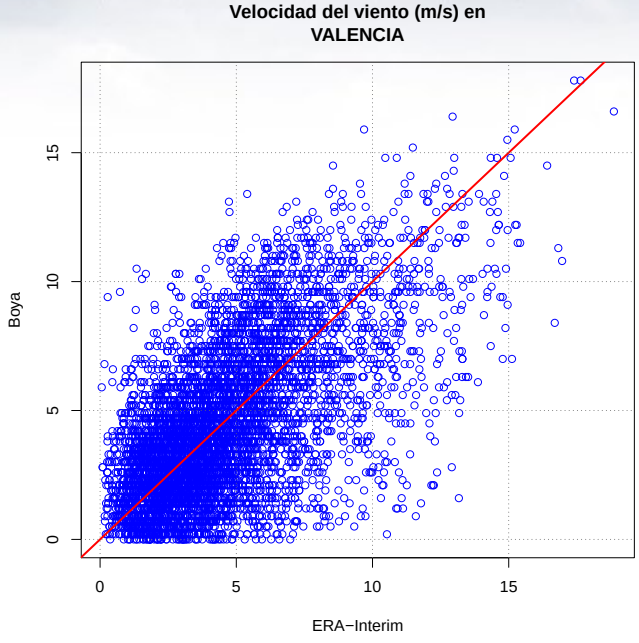


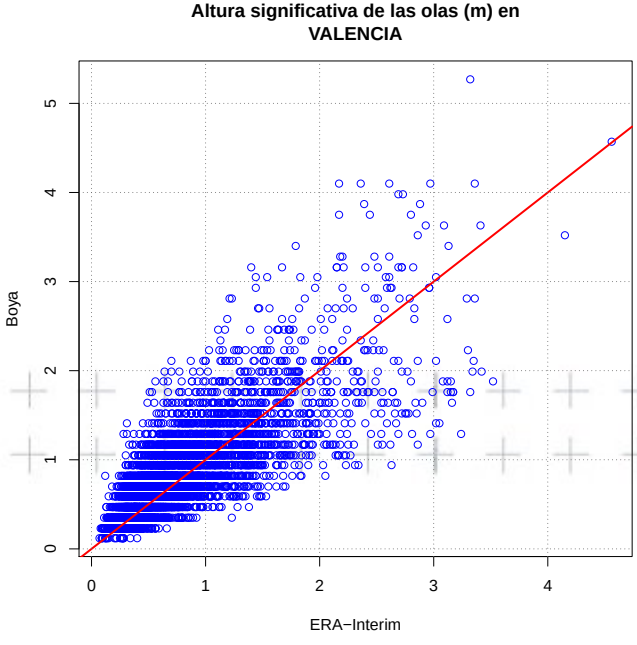


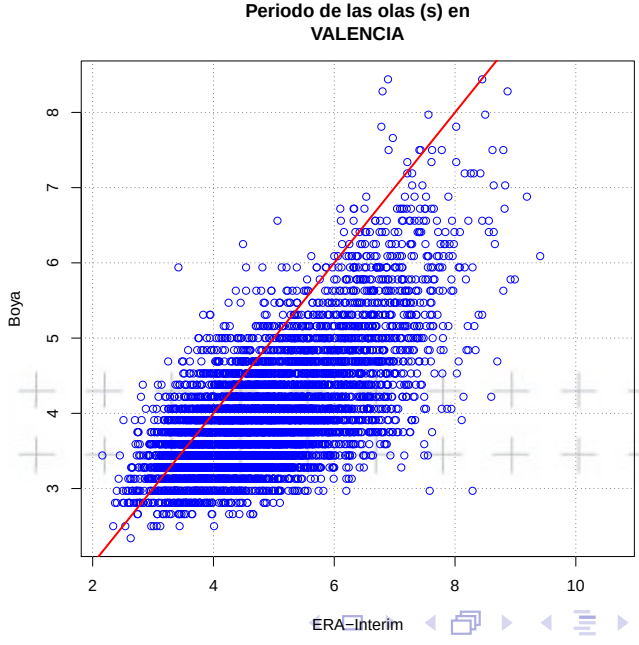


ERA-I vs buoy data



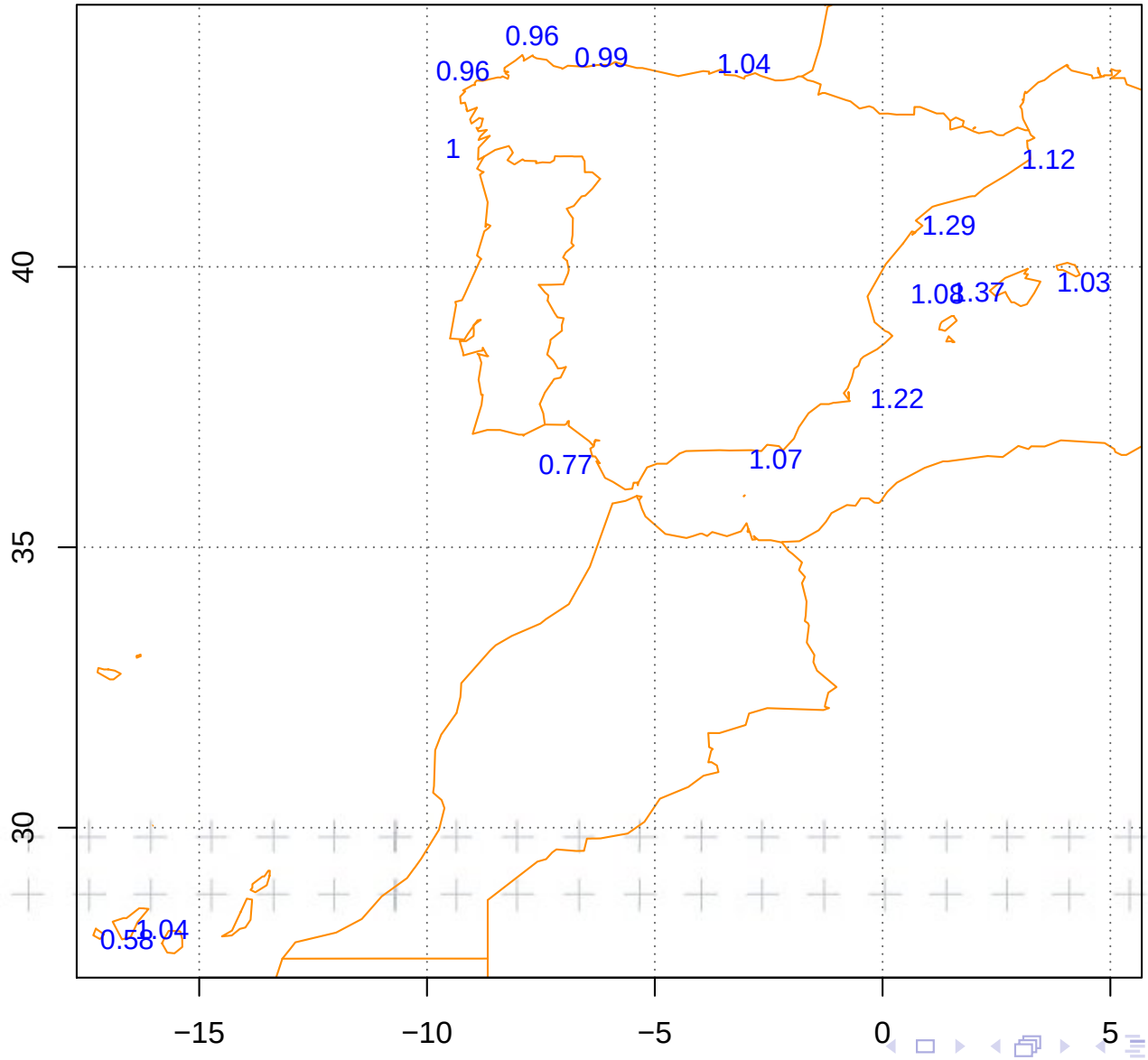






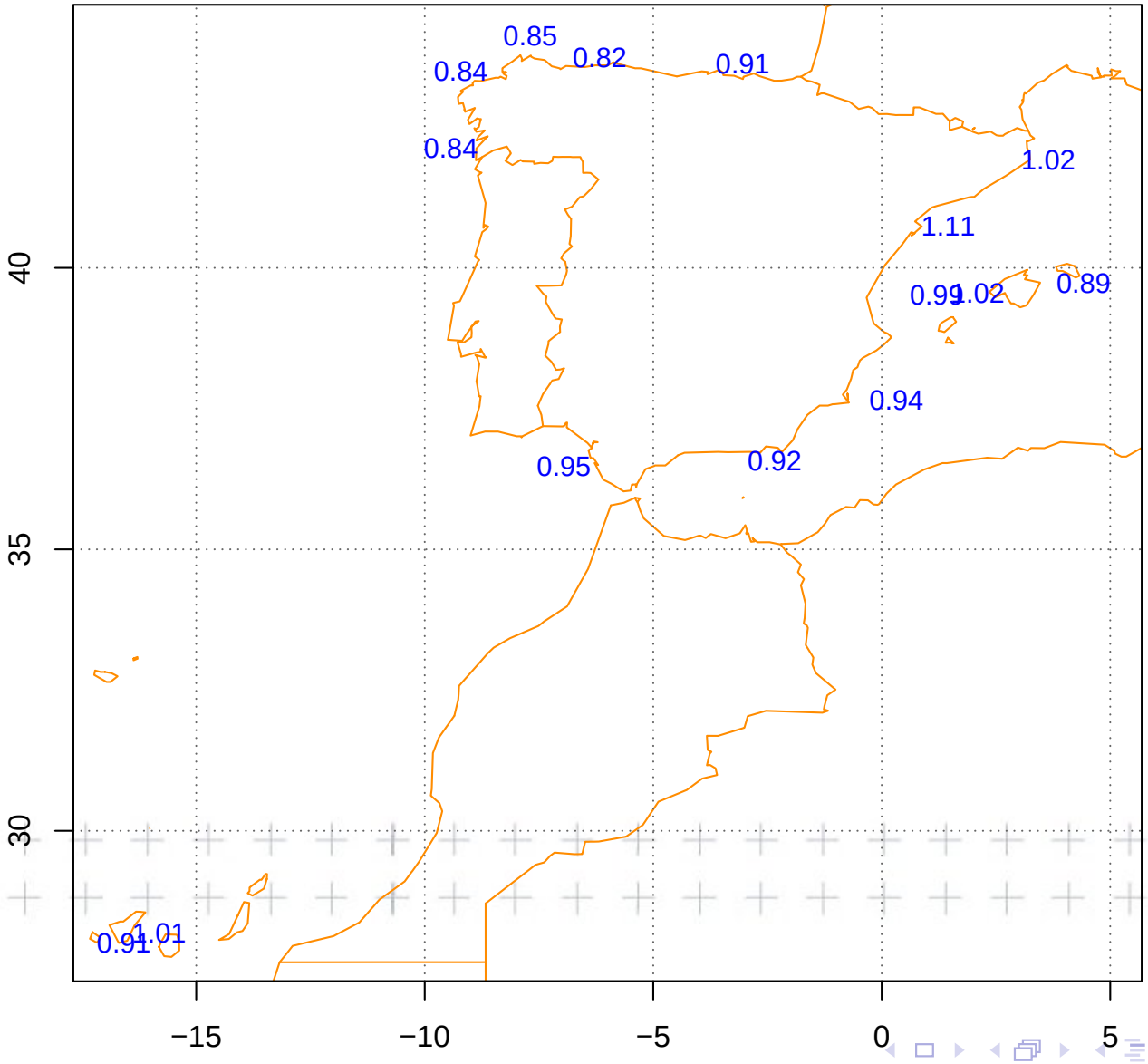
H_s corrections

Altura significativa de las olas
Factores de corrección de la media de ERAi

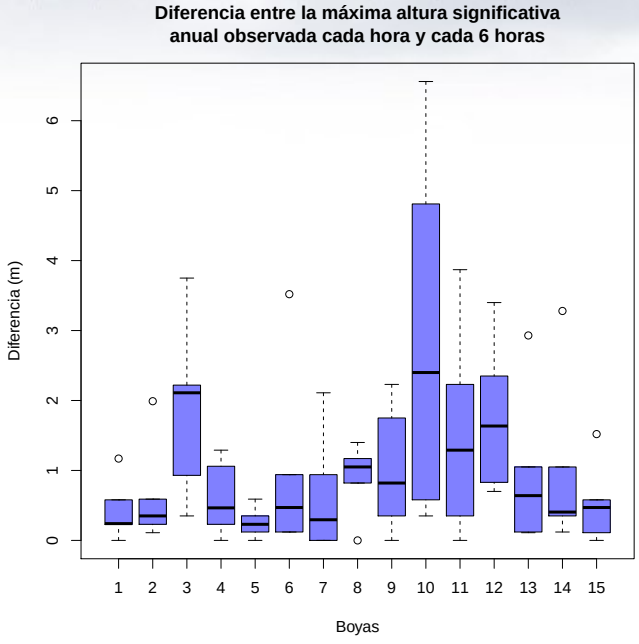


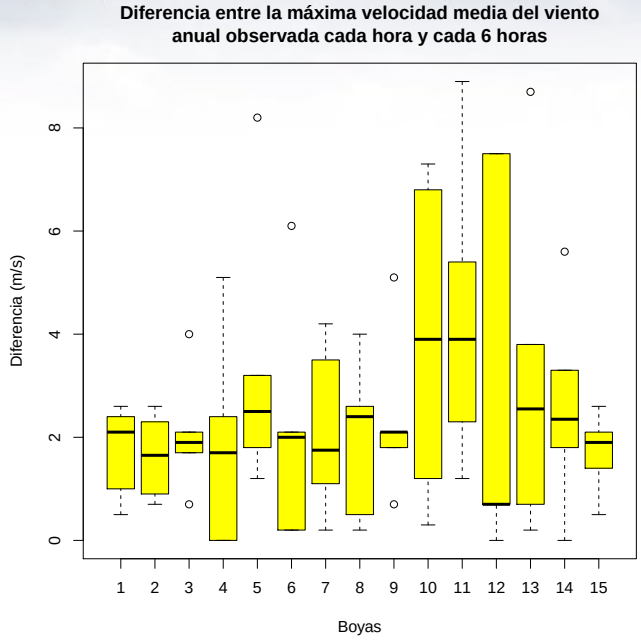
Wind speed corrections

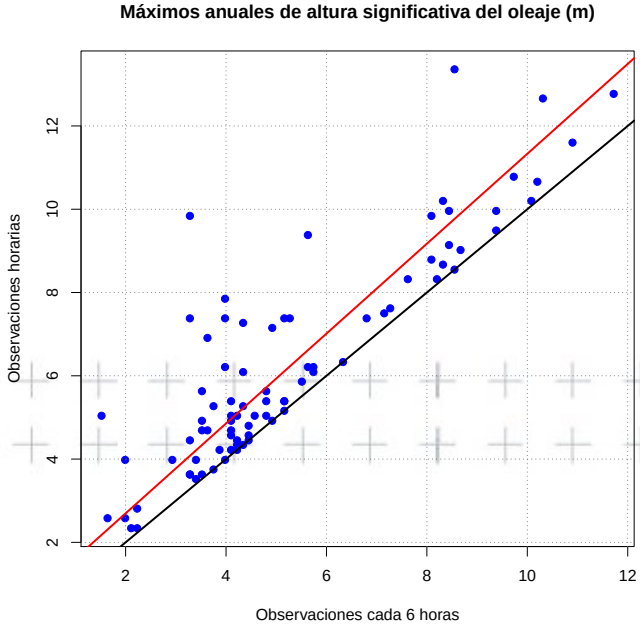
Viento medio a 10 m de altura
Factores de corrección de la media de ERAi

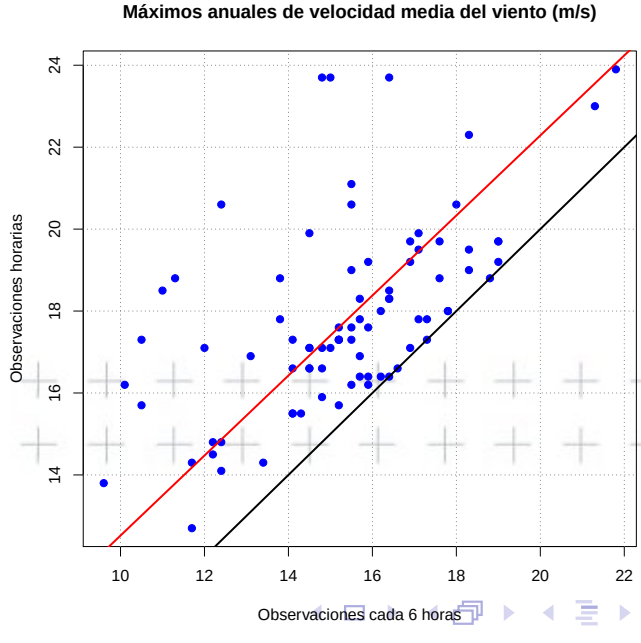


ERA-I vs buoy extremes









Atlas contents

- Monthly and annual maps of:
  - Percentiles 50, 95 and 100 of significant wave height, wind speed, mean period and sea surface temperature.
  - Wind roses
  - Frequencies of significant wave height over 2.5, 6 y 9 m
  - Frequencies of wind speed over 11.1, 17.3 y 24.4 m/s
- Climatic summaries for selected 1x1° cells with:
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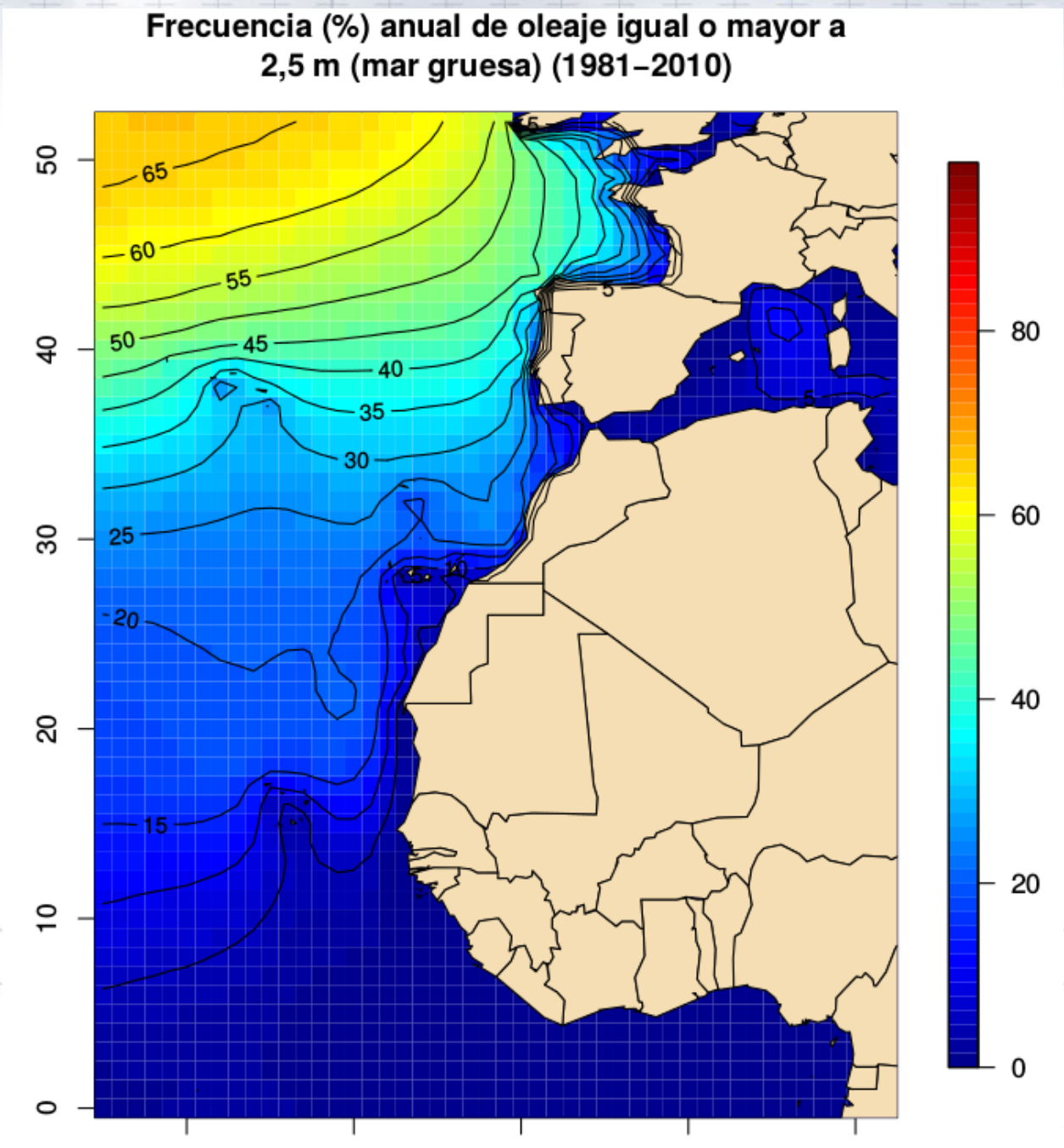
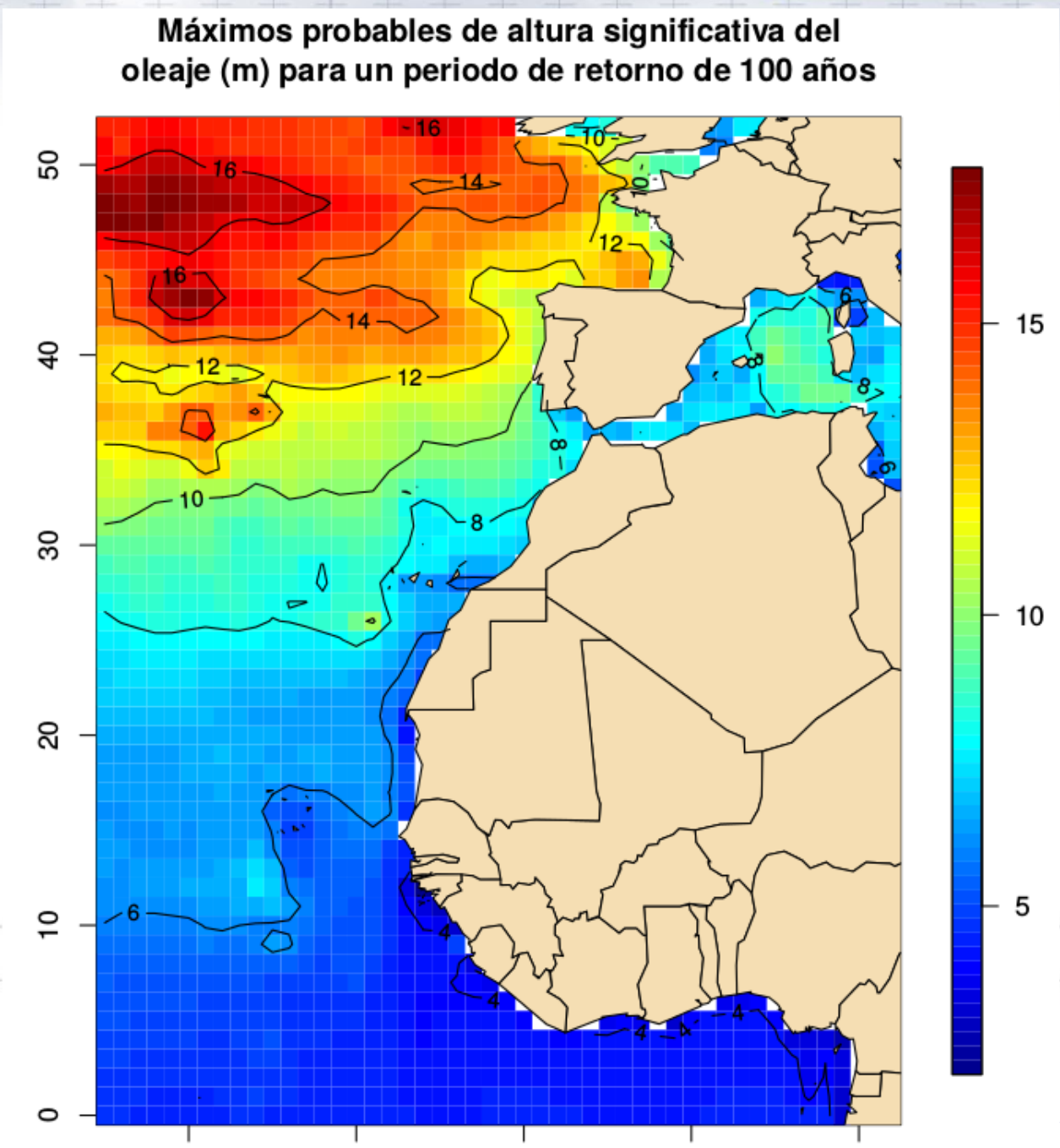
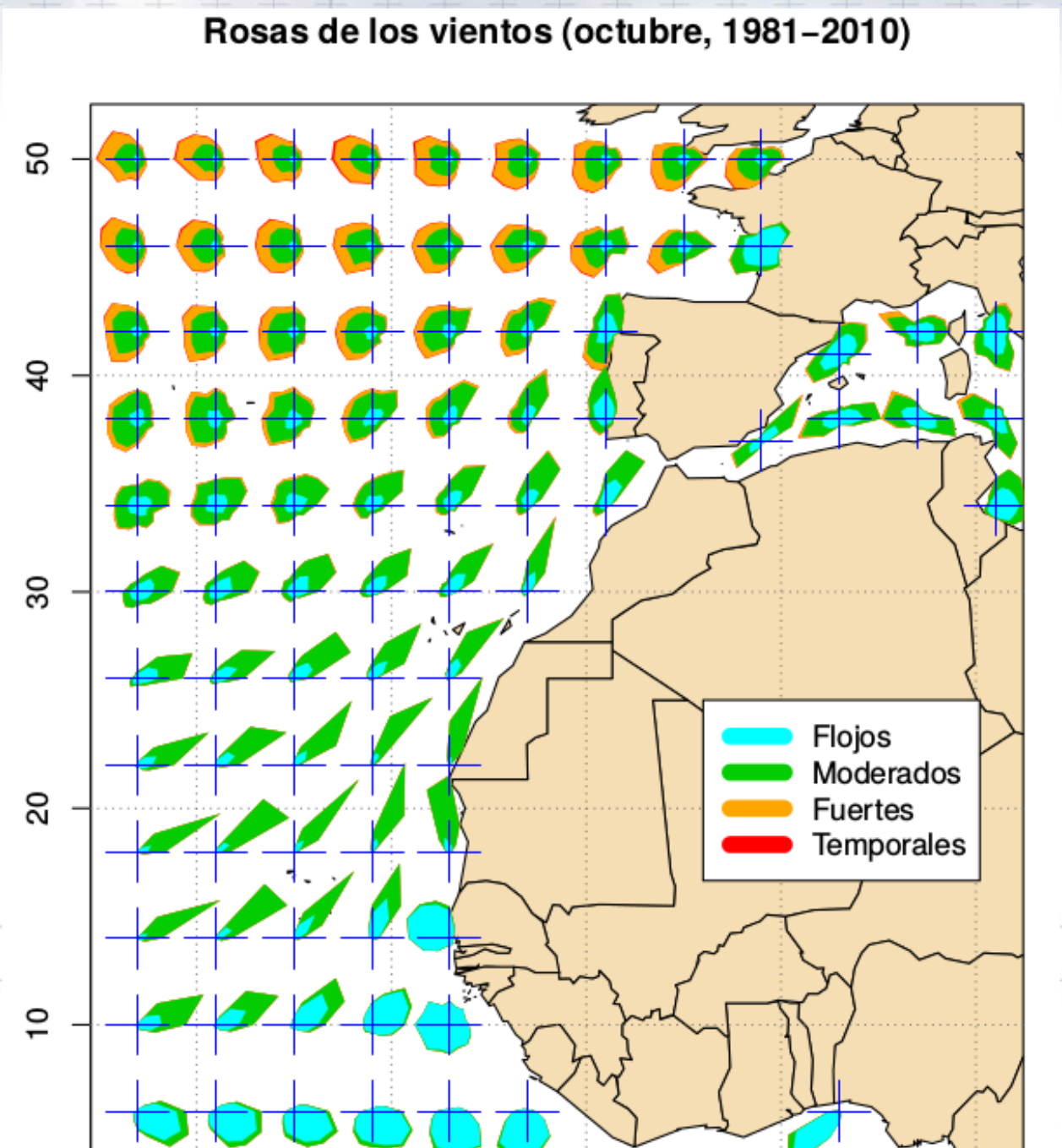
% of $H_s \geq 2.5$ m


Frecuencia (%) anual de oleaje igual o mayor a
2,5 m (mar gruesa) (1981–2010)
65
60
55
50
45
40
35
30
25
20
15
10
5
0
10
20
30
40
50
0
20
40
60
80

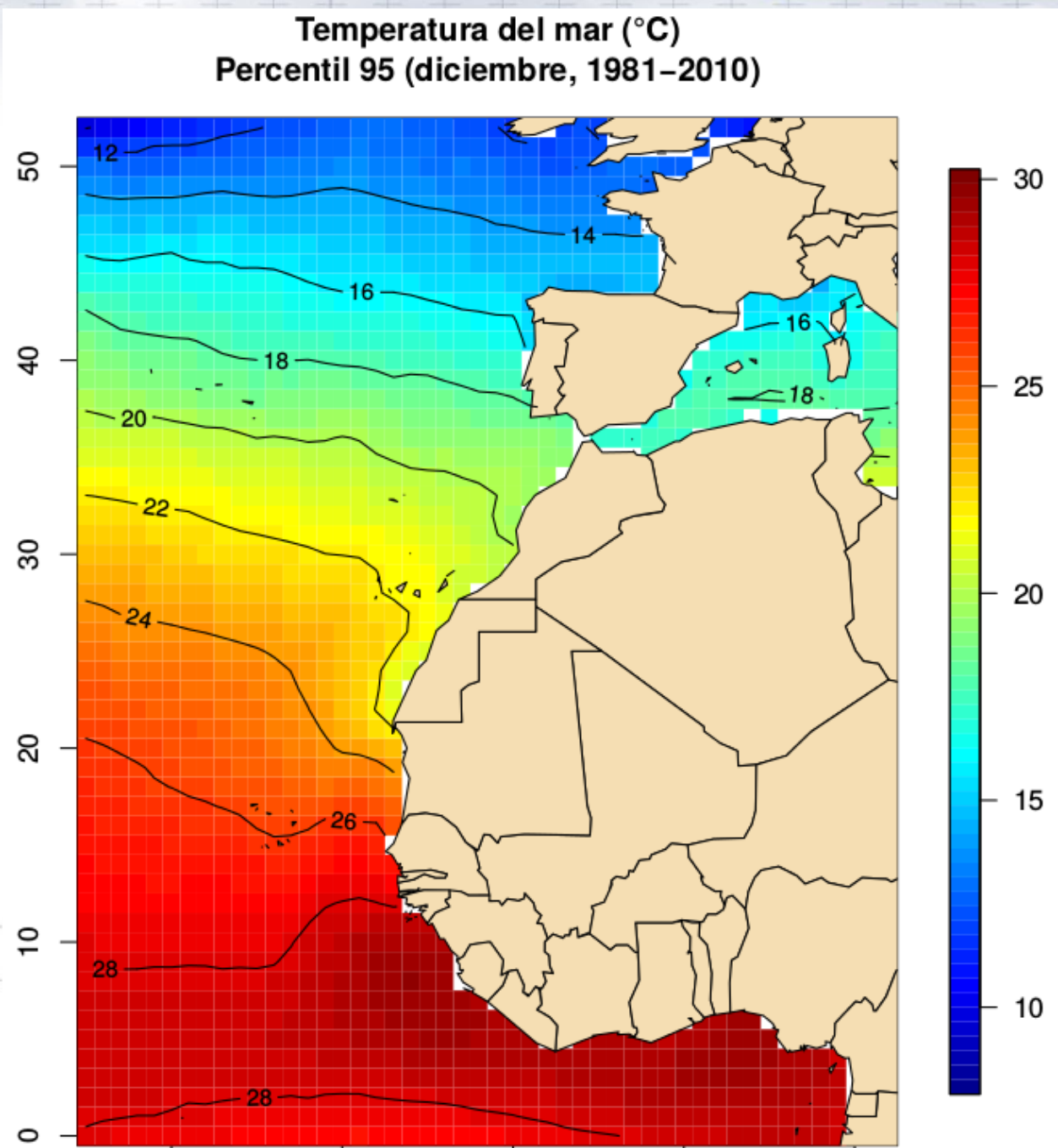
Max. H_s for 100 years R.P.



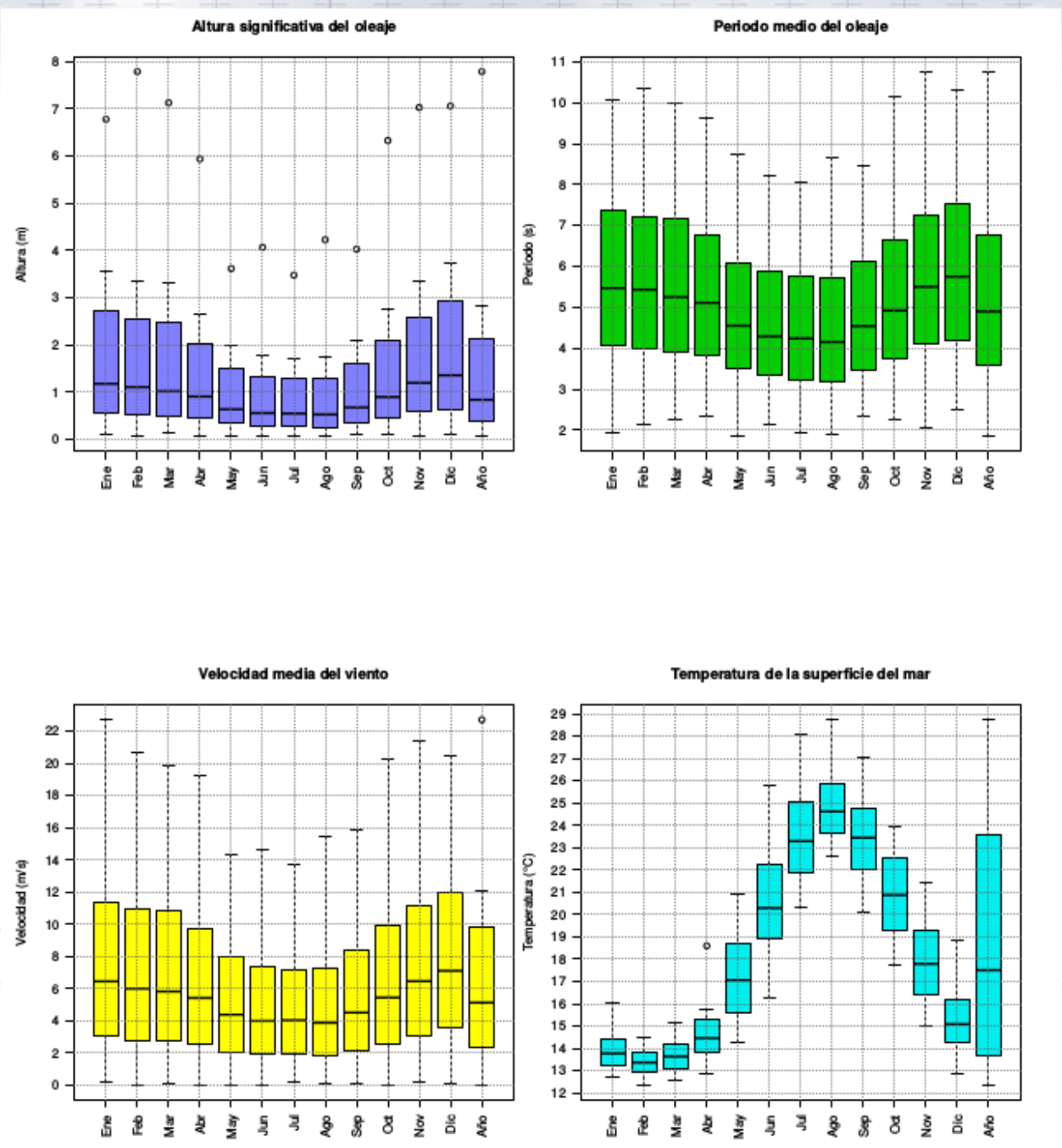
Wind roses


Rosas de los vientos (octubre, 1981–2010)
50
40
30
20
10
Flojos
Moderados
Fuertes
Temporales

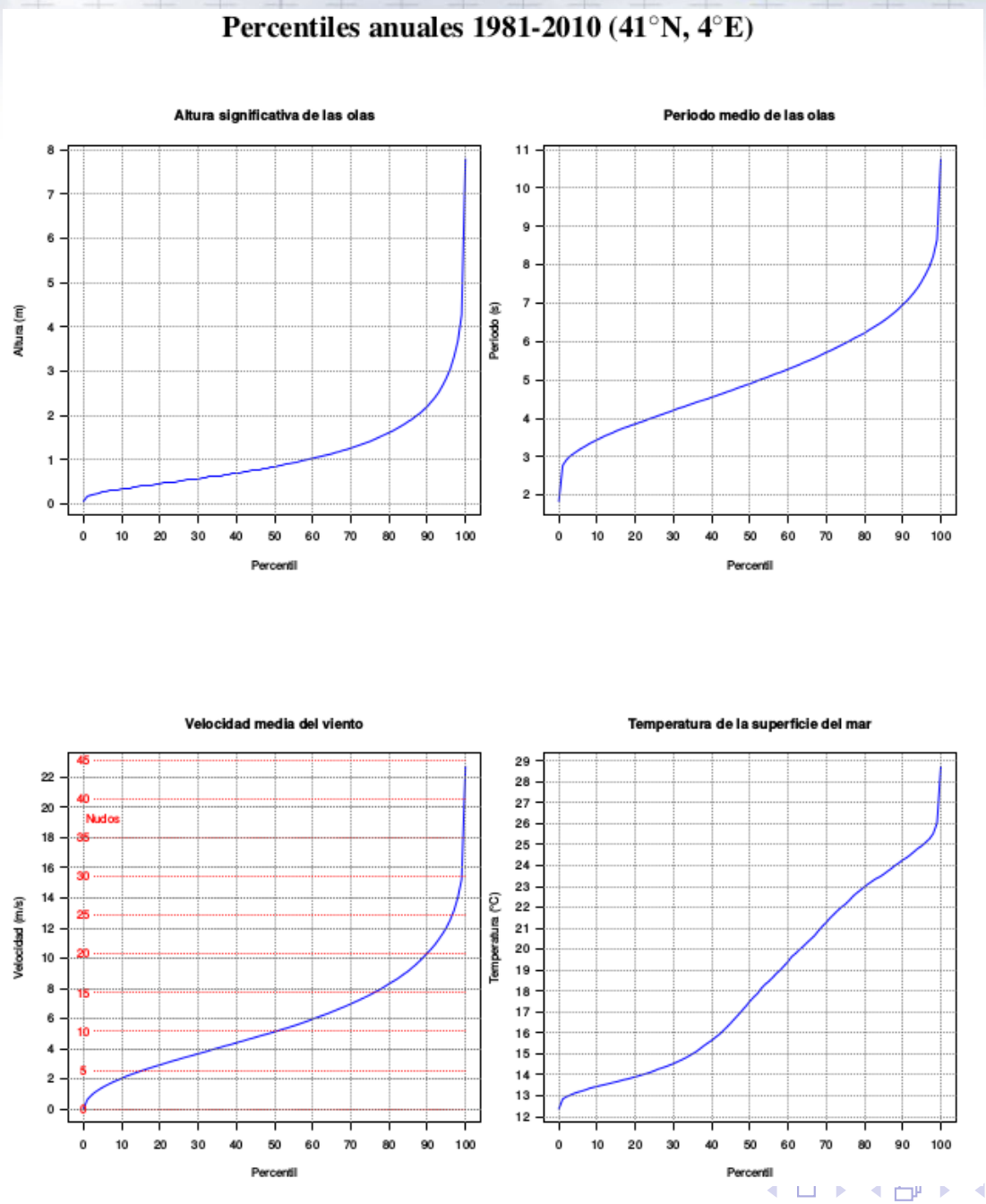
SST (December p.95)



Boxplots

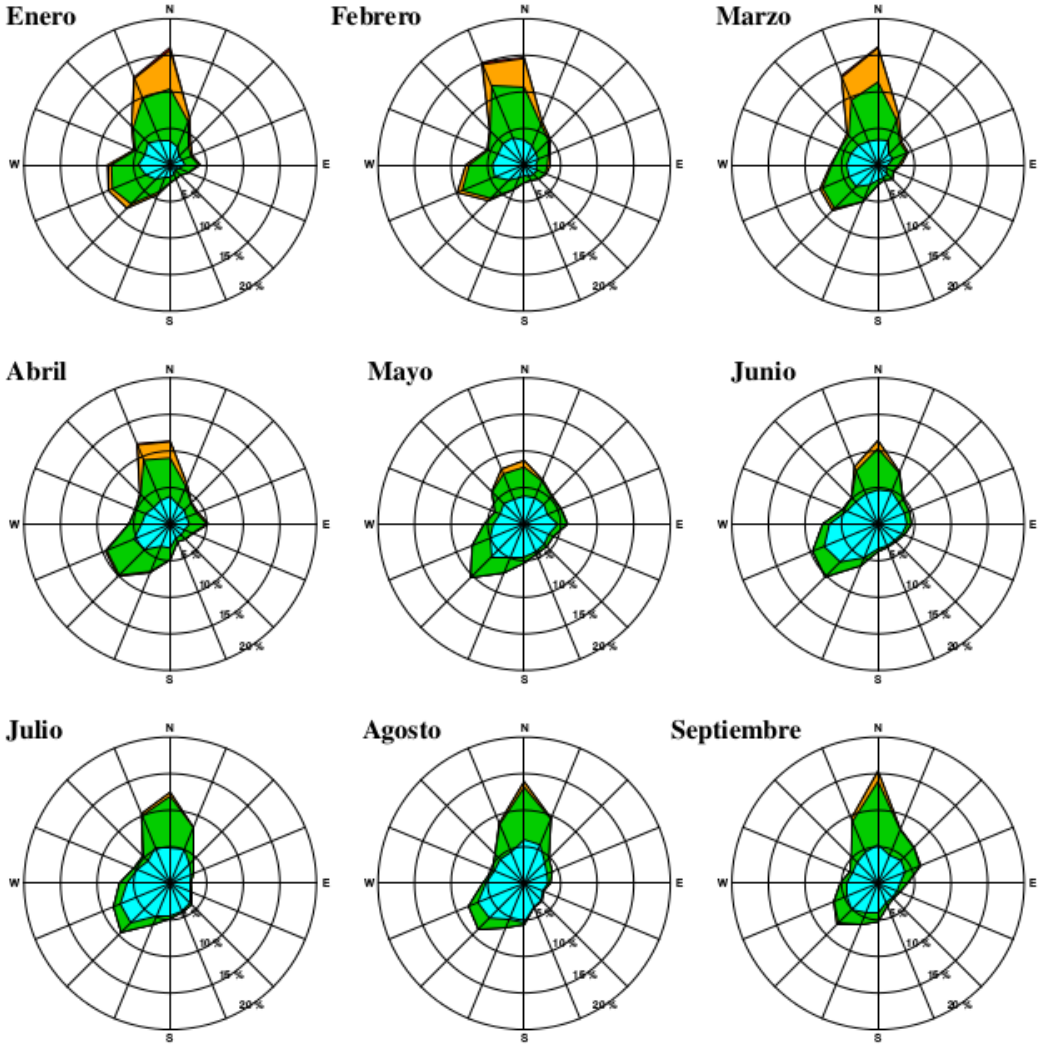

Altura significativa del oleaje
Altura (m)
Periodo medio del oleaje
Periodo (s)
Velocidad media del viento
Velocidad (m/s)
Temperatura de la superficie del mar
Temperatura (°C)
Ene
Feb
Mar
Abr
May
Jun
Jul
Ago
Sep
Oct
Nov
Dic
Año

Accumulated percentiles



Monthly wind roses

Rosas mensuales de los vientos, 1981-2010 (41°N, 4°E)



Final remarks

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- The interactive application gives more flexibility for acquiring maps and graphs for locations or thresholds not included in the Atlas.
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